

## **DRAFT ERDC Comments on Pre-Remedial Basis of Design Technical Evaluations Work Plan Gasco Sediments Cleanup Action Dated July 13, 2017**

The following are **DRAFT** U.S. Army Engineer Research and Development Center/Paul Schroeder(?) comments on the *Pre-Remedial Basis of Design Technical Evaluations Work Plan* (Work Plan), dated July 13, 2017 prepared by Anchor QEA, LLC on behalf of NW Natural.

### **Specific Comments**

1. **Section 4.2.1, Performance Standards and Design Objectives, page 14, second bullet:** the bullet text should be edited to read as follows: "Design a cap that can withstand erosive forces from currents, wind-induced waves, vessel-induced waves, and vessel propeller wash and will be stable on the existing slopes."
2. **Section 4.2.1, Performance Standards and Design Objectives, page 14, third bullet:** the bullet text should be edited to read as follows: "Design and place a cap in a way that will not exceed the bearing capacity and shear strength of the underlying sediments, and maintain slope stability of the sediments and riverbanks."
3. **Section 4.2.2, Design Elements Necessary for Capping Demonstration, page 14, first paragraph:** the text states that "Figure 5 is a flow chart developed by EPA (Palermo et al. 1998b) that illustrates the five steps involved in the design evaluation of various cap components." NW Natural should note that a component of the cap may serve the function of multiple design components and that current design practice would not separate components for each design consideration.
4. **Section 4.2.2, Design Elements Necessary for Capping Demonstration, page 14, first paragraph:** the last sentence should be modified to read as follows: "These guidance documents categorize the cap design into the following design components"
5. **Section 4.2.2, Design Elements Necessary for Capping Demonstration, page 14, first bullet:** the bullet text should be modified to read as follows: "Direct contact – determine the required cap necessary to reduce potential exposure due to direct contact and reduce the ability of burrowing organisms to move **contaminated sediment particles** to the surface."
6. **Section 4.2.2, Design Elements Necessary for Capping Demonstration, page 14, second bullet:** the word "Stabilization" should be changed to "Filtering".
7. **Section 4.2.2, Design Elements Necessary for Capping Demonstration, page 14, "Erosion" bullet:** the bullet text should be modified to read: "determine the grain size and thickness required to prevent erosion of the cap at the existing slopes."

8. **Section 4.2.2, Design Elements Necessary for Capping Demonstration, page 14, "Chemical Isolation Component" bullet:** the bullet text should be updated to read as follows: "Contaminant transport—determine the cap characteristics necessary to control the breakthrough into and recontamination of the bio-active zone above risk-based remediation goals of chemical contaminants..."
9. **Section 4.2.3.1, Physical Isolation, page 17, first bullet:** the text states that "Demonstrate the cap will be thick enough or coarse-grained enough to prevent direct contact by benthic organisms with the underlying contaminated sediments." Being coarse-grained is not a requirement for physical isolation and it may not be good for meeting filtering criteria or for limiting inter-mixing between sediment and capping material during placement. Edit the text to provide an explanation for how being coarse-grained allows the cap to provide physical isolation from benthic organisms, or delete this phrase from the text.
10. **Section 4.2.3.2, Chemical Isolation, page 18, last paragraph:** the text states that: "As presented in the Draft EE/CA (Anchor QEA 2012a) and the groundwater source control presentation to EPA by NW Natural on September 21, 2015 (Anchor QEA 2015), the upland Alluvial WBZ HC&C system reverses the offshore alluvium groundwater gradient (i.e., from toward the river to toward the upland) over a substantial portion of the Interim Project Area and, therefore, minimizes long-term contaminant advection to the river over most of the site, leaving only the diffusion process as a possible means of contaminant transport to the river." NW Natural should note that this would reduce diffusive flux as well. The text should be updated accordingly.
11. **Section 4.2.3.2, Chemical Isolation, page 18, last paragraph:** the text states that: "The Fill WBZ groundwater containment technology will be in place before the sediment remedy is implemented." Edit the text to incorporate a discussion on how long the Fill WBZ system will be operated and if the design should consider conditions prior to the groundwater containment.
12. **Section 4.2.3.2, Chemical Isolation, page 19, first bullet:** Is the RAL the same as the long-term remedial goal? RAL is not necessarily appropriate since the media will be different (lower TOC). Is RAL normalized? Pore water concentration maintained below water quality criteria or concentration associated with sediment pore water at RAL.
13. **Section 4.2.3.2, Chemical Isolation, page 19, second bullet:** Significant dilution can occur at 1 cm depth due to wave pumping and differential water stage. 5 cm depth would be better.
14. **Section 4.2.3.2.1, Method of Analysis, page 19, first paragraph:** the text states that: "The time-variable Reible model will be used; the theory and solution techniques associated with the time-variable model are documented in Go et al. (2009)." This model has limitations in the surface processes. It does not specifically address sedimentation, resuspension and surface flux. The model applies an uncalibrated mass transfer coefficient to address surface conditions. It would be best applied to predict

**Commented [AW1]:** Similar to existing comment

**Commented [AW2]:** These two concerns were captured in the following EPA comment:

Section 4.2.3.2, Chemical Isolation (Element 1 - Contaminant Confinement of Capping Demonstration Evaluation), page 19, 2nd bullet: this section includes a performance standard to "demonstrate that the long-term predicted surface water concentrations above the cap isolation layer and associated with groundwater flux through the cap are **less than applicable ecological chronic surface water criteria** (e.g., related to surface water-dwelling organism exposures)". The conservative approach analysis compares pre-dilution **porewater concentrations at a depth of 1 cm below the surface** of the top of the modeled cap to the water quality criteria" (emphasis added). EPA disagrees with this performance standard. Rather, cleanup levels based on RAOs 4 and 8 specified in ROD Table 17 should be achieved throughout the upper 30 cm of the sediment bed or cap material for a period of at least 100 years.

concentrations at the bottom of the biologically active zone. NW Natural should consider the use of the USACE Cap/Recovery model as another alternative.

15. **Section 4.2.3.2.1, Method of Analysis, page 19, second paragraph:** the text states that: “The model predicts chemical concentrations at the locations identified in the performance standards summarized above. Consistent with evaluations at other sites...”

This model is not good with predicting concentrations at performance standard locations and is best at locations below the biologically active zone.

**Commented [AW3]:** Would it be acceptable now that EPA point of compliance is 30 cm?

16. **Section 4.2.3.2.1, Method of Analysis, page 20, first paragraph:** the text states that “If the model-predicted concentrations exceed the water and sediment quality-based performance standards noted above, additional modeling will be performed to determine if the addition of treatment layers (such as activated carbon or organoclay) into the cap material will attain the performance standards.” Additional thickness or alternative capping media should be considered as well. The sensitivity to surface processes should also be evaluated along with other inputs.
17. **Section 4.2.6, Element 4 – Presence and Effect of Debris, page 28, first paragraph:** the text states that “This assessment would determine whether exposed debris can be capped in place such that the cap is effective per the guidance design considerations (e.g., Figure 5) or if it must be removed at the mudline prior to capping.” The assessment should consider that debris extending up through the cap can cause localized scour and the text should be updated accordingly.
18. **Section 4.2.6.1, Method of Analysis, page 28, first paragraph:** the text states that “For instance, removal of abandoned piling may reduce the stability of existing slopes where a cap is to be placed – a better alternative may be to cut the piling at or just below the mudline.” NW Natural should note that this can provide a preferential route for advection and should be avoided as much as possible.
19. **Section 4.2.7, Element 5 – Slope Stability, page 29:** this section should include a discussion of seismic considerations.
20. **Section 4.2.8.1, Method of Analysis, page 32, first paragraph:** Provide geotechnical considerations appendix to ISSRG.
21. **Section 4.2.8, Element 6 – Bearing Capacity, page 33:** this section should include a discussion of seismic considerations and liquefaction.
22. **Section 4.2.9, Element 7 – Treatment Requirements, page 34, first paragraph:** the text states that “Rather, the need for treatment layers is determined as part of the contaminant containment assessment completed using existing Final Project Area conditions and modeling.” Thickness limitations based on stability, bearing capacity or water depth would also dictate the need for treatment if the allowable thickness is not adequate for contaminant containment. The text should be updated accordingly.

**Commented [AW4]:** Same as EPA comment:

The ROD states that “caps will also factor in appropriate earthquake design elements for contingency level events” (ROD p. 113). However, no consideration of earthquakes or their impacts is given in this Work Plan. Considering that the Cascadia subduction zone is at risk for a major earthquake, revise the document to note that any design will include relevant earthquake design elements, as stipulated in the ROD.

**Commented [AW5]:** Please provide guidance on how to formulate this into a clear directive.

23. **Section 4.2.9, Element 7— Treatment Requirements, page 34:** this section needs to discuss characterization of the capacity and effectiveness of amendments.
24. **Section 4.3.1, Performance Standards and Design Objectives, page 36, first bullet:** the bullet text states that “Remove, to the extent practicable, contaminated sediment concentrations exceeding the ROD-identified RALs (Table 5) and sediments containing PTW-NAPL/NRC that are not shown to be suitable for capping using pre-design data. Removal throughout the dredge prism will be deemed complete when comparison of the pre- and post-construction bathymetry surveys identify the design dredge elevations or depths are achieved.” The text should discuss how it will be verified that the cleanup levels identified in Table 17 of the ROD have been met during dredging.
25. **Section 4.3.5, Basis of Design Technical Evaluation Memorandum Elements, page 40, fifth bullet:** the text states that “Identification of necessary dredging offsets from structures to avoid negative impacts” Location controls should be employed laterally and vertically. The text should be updated accordingly.
26. **Section 4.3.5, Basis of Design Technical Evaluation Memorandum Elements, page 40, ninth bullet:** the text states that “Construction quality control/quality assurance measures to confirm the dredge work” Residuals monitoring should be conducted during construction.
27. **Section 4.3.5, Basis of Design Technical Evaluation Memorandum Elements, page 40, tenth bullet:** the text states that “Water quality monitoring procedures to monitor the dredging work” Resuspension controls and impact zones should be implemented as part of dredging BMPs.
28. **Section 4.4, Riverbank Remedy Evaluation, page 41, third bullet:** the text should be edited to read as follows: “Remediation or stabilization may be needed where riverbank erosion evaluations show the potential for sediment recontamination based on soil erosion or slope instability.”
29. **Section 4.8.2, Operational Controls, page 53, first bullet:** the text states that “Requiring a debris sweep prior to dredging in known debris areas (debris caught in dredging equipment can cause additional resuspension and release of contaminated sediments)” NW Natural should note that separate debris removal activities may disturb the sediment structure leading to greater erosion and resuspension during dredging. Debris removal should be incorporated with dredging activities and the same equipment should be used for both.
30. **Section 4.8.2, Operational Controls, page 53, fourth bullet:** the text states that “Slowing the rate of dredge bucket descent and retrieval (increasing dredge cycle time)” Note that the cut depth should be controlled so as to not overfill buckets.
31. **Section 4.8.2, Operational Controls, page 53, fifth bullet:** the text states that “Limiting operations during relatively high-water velocity conditions (turbulence in the vicinity of the dredge bucket during high flow conditions can cause additional resuspension and

**Commented [AW6]:** Please correct as needed

**Commented [AW7]:** PRS note: residuals monitoring/ generated and undisturbed?

**Commented [AW8]:** PRS note: Resuspension controls and impact zones

Please confirm this comment was meant for this specific bullet point

release of contaminated sediments)” Conducting operations during high-water provides greater dilution but greater erosion of residuals. Residuals should be covered immediately after dredging to prevent erosion of residuals. NW Natural should also note that residuals losses are greater than resuspension losses. The text should be updated to reflect this.

32. **Section 4.8.2, Operational Controls, page 53, eighth bullet:** the text states that “Preventing the overfilling of conventional clamshell (i.e., “open”) buckets” **Equally important for closed buckets because it creates residuals that are erodible.**
33. **Section 4.8.2, Operational Controls, page 53, ninth bullet:** the text states that “Requiring the slow release of excess bucket water at the water surface” The release of water is bad for water quality and losses. NW Natural should consider treating barge water.
34. **Section 4.8.3, Barrier Controls, page 53, second bullet:** NW Natural should note that **silt curtains have limited value** as engineered barrier controls.
35. **Section 4.8.3, Barrier Controls, page 54, first bullet:** the text states that “Release of highly concentrated contaminants sequestered within the containment area following removal of the containment barrier” NW Natural could also consider treating such releases and should include this as part of the engineered barrier controls research described in this section.
36. **Section 4.9, Habitat Modification Evaluation, page 57, first paragraph:** the text states that “Consistent with the ROD (EPA 2017a) requirements, a clean surface layer of residuals management cover (i.e., a clean sand) will be placed throughout all dredge areas, which will generally provide improved habitat and food web benefits once the area is recolonized by benthic species.” The residuals management cover should be of a **material of same nature as originally present.**

**Commented [PL9]:** not following

**Commented [AW10R9]:** Paul, please help expand on this

**Commented [AW11]:** Please confirm that this comment was meant to address the use of silt curtains.

**Commented [AW12]:** Note that the ROD defines the residual layer as a layer of material, generally sand, used to cover sediments disturbed by dredging or contaminated sediments left behind